REMARKS

Claim 7 has been previously canceled. Claims 1 through 6 and 8 through 20 remain in the application.

Claims 1 through 6 and 8 through 20 were rejected under 35 U.S.C. § 103 as being unpatentable over Nayar (DENEB/ERGO-A Simulation-based Human Factors Tool (1995)) in view of Purschke (Virtual Reality-New Methods for Improving and Accelerating the Development Process in Vehicle Styling and Designing (1998)). Applicants respectfully traverse this rejection.

As to patentability, 35 U.S.C. § 103 provides that a patent may not be obtained:

> If the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Id.

The United States Supreme Court interpreted the standard for 35 U.S.C. § 103 in Graham v. John Deere, 383 U.S. 1, 148 U.S.P.Q. 459 (1966). In Graham, the Court stated that under 35 U.S.C. § 103:

> The scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or non-obviousness of the subject matter is determined. 148 U.S.P.Q. at 467.

The publication "A Simulation-based Human Factors Tool" to Nayar discloses that Deneb/ERGO includes a fully-functional 3D CAD system. This allows the user to either create desired geometry rapidly or use the CAD data translators such as IGES, Pro/ENGINEER, Unigraphics, DXF, STEP, CATIA and VDA to import existing geometry. Data reduction facilities are provided to simplify or modify geometry to enhance graphics performance.

Furthermore, existing geometry can be scaled and stored on the hard disk to build libraries of tools/parts that are commonly used in the working environment. A teaching process is done through a dedicated human motion programming interface. In this paradigm, the user teaches the worker motion sequences. These utilities also facilitate teaching tasks in a parametric way so that the same motion sequences can be used to test the desired range of population. Nayar does not disclose a scaleable physical property representative of a vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design and the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population.

The publication "Virtual Reality-New Methods for Improving and Accelerating the Development Process in Vehicle Styling and Design" to Purschke et al. discloses the use of virtual reality techniques during the car development process. As input devices, a CyberGlove is used for navigating in the virtual environment and for gesture recognition. Purschke et al. does not disclose a scaleable physical property representative of a vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design and the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population.

In contradistinction, claim 1 claims the present invention as a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality including a scaleable physical property representative of the vehicle design. The physical property is adjusted according to a scale ratio for an evaluator of the vehicle design. The scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population. The system also includes a computer system for digitally creating a virtual environment having a virtual human immersed within the virtual

environment, wherein the virtual environment includes the vehicle design and the virtual human virtually represents a scaled evaluator. The system includes a motion capture system for sensing a motion of the evaluator and communicating the sensed motion of the evaluator to the computer system, so that the motion of the evaluator controls the motion of the virtual human in the virtual environment. The system further includes a virtual reality display mechanism operatively communicating with the computer system, for providing the evaluator a view of the virtual environment while evaluating the vehicle design.

The United States Court of Appeals for the Federal Circuit (CAFC) has stated in determining the propriety of a rejection under 35 U.S.C. § 103, it is well settled that the obviousness of an invention cannot be established by combining the teachings of the prior art absent some teaching, suggestion or incentive supporting the combination. See In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 U.S.P.Q. 657 (Fed. Cir. 1985); ACS Hospital Systems, Inc. v. Montefiore Hospital, 732 F.2d 1572, 221 U.S.P.Q. 929 (Fed. Cir. 1984). The law followed by our court of review and the Board of Patent Appeals and Interferences is that "[a] prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art." In re Rinehart, 531 F.2d 1048, 1051, 189 U.S.P.Q. 143, 147 (C.C.P.A. 1976). See also In re Lalu, 747 F.2d 703, 705, 223 U.S.P.Q. 1257, 1258 (Fed. Cir. 1984) ("In determining whether a case of prima facie obviousness exists, it is necessary to ascertain whether the prior art teachings would appear to be sufficient to one of ordinary skill in the art to suggest making the claimed substitution or other modification.")

As to the differences between the prior art and the claims at issue, Nayar merely discloses a simulation-based human factors tool in which a fully-functional 3D CAD system

allows existing geometry to be scaled and stored on a hard disk to build libraries of tools/parts that are commonly used in a working environment and a dedicated human motion programming interface that teaches the worker motion sequences so that the same motion sequences can be used to test a desired range of population. Nayar lacks a scaleable physical property representative of a vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design. In Nayar, while existing geometry can be scaled and stored to build libraries, it does not mention that a physical property of a vehicle design is adjusted according to a scale ratio for an evaluator of the vehicle design. Nayar also lacks a scale ratio that is a ratio between a predetermined dimension of an evaluator and a predetermined dimension of a member of a target population. In Nayar, while worker motion sequences can be used to test a desired range of population, it does not mention that a scale ratio is a ratio between a predetermined dimension of an evaluator and a predetermined dimension of a member of a target population.

Purschke et al. merely discloses the use of virtual reality techniques during the car development process in which a CyberGlove is used for navigating in the virtual environment and for gesture recognition. Purschke et al. lacks a scaleable physical property representative of the vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design and the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population. In Purschke et al., there is no mention of a physical property being adjusted according to a scale ratio for an evaluator or a scale ratio is a ratio between a predetermined dimension of an evaluator and a predetermined dimension of a member of a target population. As such, there is no suggestion or motivation in the art to combine Nayar and Purschke et al. together.

There is absolutely no teaching of a level of skill in the vehicle design art that a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality includes a scaleable physical property representative of the vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design and the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population. The Examiner may not, because he doubts that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in the factual basis. See In re Warner, 379 F. 2d 1011, 154 U.S.P.Q. 173 (C.C.P.A. 1967). While Nayar teaches a simulation-based human factors tool in which a fully-functional 3D CAD system allows existing geometry to be scaled, Nayar does not teach or suggest a vehicle design within a virtual environment including a scaleable physical property representative of the vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design and the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population. Contrary to the Examiner's opinion, Nayar has nothing to do with vehicle design and therefore cannot disclose a scalable physical property representative of a vehicle design. Further, Purschke et al. does not make up for these deficiencies. Purschke et al. teaches the use of a CyberGlove for navigating in a virtual environment. Purschke et al. does not teach a scaleable physical property representative of a vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design and the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population. Thus, none of the references teaches a level of skill in the art of vehicle design having a scaleable physical property representative of the vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design.

The present invention sets forth a unique and non-obvious combination of a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality that scales the size of the evaluator in the virtual vehicle environment, so the evaluator can understand how another member of the target population perceives the vehicle design. The references, if combinable, fail to teach or suggest the combination of a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality including a scaleable physical property representative of the vehicle design, wherein the physical property is adjusted according to a scale ratio for an evaluator of the vehicle design and the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of a target population, a computer system for digitally creating a virtual environment having a virtual human immersed within the virtual environment, wherein the virtual environment includes the vehicle design and the virtual human virtually represents a scaled evaluator, a motion capture system for sensing a motion of the evaluator and communicating the sensed motion of the evaluator to the computer system, so that the motion of the evaluator controls the motion of the virtual human in the virtual environment, and a virtual reality display mechanism operatively communicating with the computer system, for providing the evaluator a view of the virtual environment while evaluating the vehicle design as claimed by Applicants.

Further, the CAFC has held that "[t]he mere fact that prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification". In re Gordon, 733 F.2d 900, 902, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984). The Examiner has failed to show how the prior art suggested the desirability of modification to achieve Applicants' invention. Thus, the Examiner has failed to establish a case of prima facie obviousness. Therefore, it is respectfully submitted that claims 1 through 6 are allowable over the rejection under 35 U.S.C. § 103.

As to claim 8, claim 8 claims the present invention as a method of subjective evaluation of a vehicle design within a virtual environment using virtual reality. The method includes the steps of preparing an evaluator of a vehicle design for immersion as a virtual human in the virtual environment, wherein the virtual environment is created within a computer system and includes the vehicle design. The method also includes the steps of determining a scale ratio and range of a target population for the evaluator, wherein the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of the target population. The method includes the steps of preparing an adjustable property using the vehicle design and the scale ratio and growing the virtual human within the virtual environment to virtually represent a scaled evaluator. The method further includes the steps of aligning the virtual human in the virtual environment with the evaluator and the property, performing the evaluation of the vehicle design by the evaluator, and using the evaluation of the vehicle design in the design of the vehicle. Claim 15 is similar to claim 8 and includes other features of the present invention.

As to the differences between the prior art and the claims at issue, Nayar merely discloses a simulation-based human factors tool in which a fully-functional 3D CAD system allows existing geometry to be scaled and stored on a hard disk to build libraries of tools/parts that are commonly used in a working environment and a dedicated human motion programming interface that teaches the worker motion sequences so that the same motion sequences can be used to test a desired range of population. Nayar lacks determining a scale ratio and range of a target population for an evaluator. In Nayar, while existing geometry can be scaled and stored to build libraries, it does not mention determining a scale ratio and range of population for an evaluator. Nayar also lacks a scale ratio that is a ratio between a predetermined dimension of an evaluator and a predetermined dimension of a member of a target population. In Nayar, while

worker motion sequences can be used to test a desired range of population, it does not mention that a scale ratio is a ratio between a predetermined dimension of an evaluator and a predetermined dimension of a member of a target population.

Purschke et al. merely discloses the use of virtual reality techniques during the car development process in which a CyberGlove is used for navigating in the virtual environment and for gesture recognition. Purschke et al. lacks determining a scale ratio and range of a target population for an evaluator, wherein the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of the target population. In Purschke et al., there is no mention of determining a scale ratio and range of a target population for an evaluator or a scale ratio that is a ratio between a predetermined dimension of an evaluator and a predetermined dimension of a member of a target population. As such, there is no suggestion or motivation in the art to combine Nayar and Purschke et al. together.

There is absolutely no teaching of a level of skill in the vehicle design art that a method for subjective evaluation of a vehicle design within a virtual environment using virtual reality includes the steps of determining a scale ratio and range of a target population for an evaluator, wherein the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of the target population. The Examiner may not, because he doubts that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in the factual basis. See In re Warner, 379 F. 2d 1011, 154 U.S.P.Q. 173 (C.C.P.A. 1967). While Nayar teaches a simulation-based human factors tool in which a fully-functional 3D CAD system allows existing geometry to be scaled and that worker motion sequences can be used to test a desired range of population, Nayar does not teach or suggest that a method for subjective evaluation of a vehicle design within a virtual environment including the steps of determining a scale ratio and range of a target population for

an evaluator, and a scale ratio that is a ratio between a predetermined dimension of an evaluator and a predetermined dimension of a member of a target population. Contrary to the Examiner's opinion, Nayar has nothing to do with vehicle design and therefore cannot disclose a scalable physical property representative of a vehicle design. Purschke et al. does not make up for these deficiencies. Purschke et al. teaches the use of a CyberGlove is used for navigating in a virtual environment. Purschke et al. does not teach determining a scale ratio and range of a target population for an evaluator, wherein the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of the target population. Thus, none of the references teaches a level of skill in the art of vehicle design that a method can be constructed as determining a scale ratio and range of a target population for an evaluator, and a scale ratio that is a ratio between a predetermined dimension of an evaluator and a predetermined dimension of a member of a target population.

The present invention sets forth a unique and non-obvious combination of a system for subjective evaluation of a vehicle design within a virtual environment using virtual reality that scales the size of the evaluator in the virtual vehicle environment, so the evaluator can understand how another member of the target population perceives the vehicle design. The references, if combinable, fail to teach or suggest the combination of a method for subjective evaluation of a vehicle design within a virtual environment using virtual reality including the steps of preparing an evaluator of a vehicle design for immersion as a virtual human in the virtual environment, determining a scale ratio and range of a target population for the evaluator, wherein the scale ratio is a ratio between a predetermined dimension of the evaluator and a predetermined dimension of a member of the target population, preparing an adjustable property using the vehicle design and the scale ratio, growing the virtual human within the virtual environment to virtually represent a scaled evaluator, aligning the virtual human in the virtual environment with

the evaluator and the property, performing the evaluation of the vehicle design by the evaluator, and using the evaluation of the vehicle design in the design of the vehicle as claimed by Applicants. Thus, the Examiner has failed to establish a case of prima facie obviousness. Therefore, it is respectfully submitted that claims 8 and 15 and the claims dependent therefrom are allowable over the rejection under 35 U.S.C. § 103.

Obviousness under § 103 is a legal conclusion based on factual evidence (In re Fine, 837 F.2d 1071, 1073, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988), and the subjective opinion of the Examiner as to what is or is not obvious, without evidence in support thereof, does not suffice. Since the Examiner has not provided a sufficient factual basis, which is supportive of his/her position (see In re Warner, 379 F.2d 1011, 1017, 154 U.S.P.Q. 173, 178 (C.C.P.A. 1967), cert. denied, 389 U.S. 1057 (1968)), the rejection of claims 1 through 6 and 8 through 20 is improper. Therefore, it is respectfully submitted that claims 1 through 6 and 8 through 20 are allowable over the rejection under 35 U.S.C. § 103.

Based on the above, it is respectfully submitted that the claims are in a condition for allowance or in better form for appeal. Applicants respectfully request reconsideration of the claims and withdrawal of the final rejection. It is respectfully requested that this Amendment be entered under 37 C.F.R. 1.116.

Respectfully submitted,

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